Abstract

This paper describes the damage behaviors of plain-woven basalt-unsaturated polyester laminates under low-velocity impact from experimental and finite-element approach. Experimental tests were carried out in an INSTRON® drop-weight machine with different initial impact energy levels varying from 15 J, 30 J, 50 J, and 70 J with specimen thicknesses of 4 mm. The results showed that as the impact energy increased, the peak force, the energy absorbed, i.e. area under the force–displacement curve, and the damage area increased. The damage mechanism included matrix crack, delamination with fiber bending, and breakage. Finite-element analyses were carried out to verify further the impact mechanism and correlation between these parameters with the induced damage by using software ABAQUS®. The finite-element method results were in good accord with the experimental results regarding peak force, maximum absorbed energy, and damage area.